

CLAIMS

1. A multi-layer wiring board comprising:

- 5 a motherboard; and
- at least one base material having a wiring circuit which is formed into a predetermined outer shape and is laminated with the motherboard,
- wherein the motherboard and the base material having a wiring circuit are electrically connected to each other through an inner via hole.

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2. The multi-layer wiring board according to claim 1, wherein the outer shape of the base material having a wiring circuit is smaller than the outer shape of the motherboard, and wherein the base material having a wiring circuit is arranged on the motherboard to form an island shape.

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3. The multi-layer wiring board according to claim 1 or claim 2, wherein a plurality of the base materials having a wiring circuit which is formed into a predetermined outer shape are laminated on the motherboard.

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4. The multi-layer wiring board according to any one of claims 1 to 3, wherein the base material having a wiring circuit comprises a base material with single-sided wiring circuit having an insulating layer and a wiring circuit formed on one surface of the insulating layer.

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5. The multi-layer wiring board according to any one of claims 1 to 4, wherein an insulating layer of the motherboard is made of a flexible resin.

6. The multi-layer wiring board according to any one of claims 1 to 5, wherein the insulating layer of the base material having a wiring circuit is made of a flexible resin

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7. The multi-layer wiring board according to any one of claims 1 to 6, wherein the insulating layer of the motherboard and the insulating layer of the base material having a wiring circuit are made of the same material.

5 8. The multi-layer wiring board according to any one of claims 1 to 7, wherein a cover layer for coating the motherboard and the base material having a wiring circuit is formed.

9. The multi-layer wiring board according to any one of claims 1 to 7, wherein a cover
10 layer having an opening is formed on the motherboard, and the base material having a wiring circuit is positioned in the opening.

10. The multi-layer wiring board according to claim 9, wherein the wiring circuit of the motherboard is exposed in a gap which is defined by the opening of the cover layer and
15 the base material having a wiring circuit, and wherein the wiring circuit of the motherboard is coated with noble-metal.

11. The multi-layer wiring board according to claim 9, wherein a second cover layer is formed so that coats the surface of the wiring board of the motherboard being exposed
20 in a gap which is defined by the opening of the cover layer and the base material having a wiring circuit.

12. The multi-layer wiring board according to any one of claims 1 to 7, wherein, among the base materials having a wiring circuit accordingly, the insulating layer of
25 the base material having a wiring circuit that contacts the motherboard is also perform as the cover layer that covers the wiring circuit of the motherboard.

13. The multi-layer wiring board according to any one of claims 1 to 12, wherein the inner via hole in the base material having a wiring circuit is filled with conductive
30 paste for electrically connect different layers one another.

14. The multi-layer wiring board according to claim 13, wherein a small hall communicating with the inner via hole is pierced in a conductor layer of the base material having a wiring circuit.

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15. A method for manufacturing a multi-layer wiring board, comprising the step of:

laminating a base material having a wiring circuit which is formed into a predetermined outer shape with at least one of a surface and a rear surface of a motherboard.

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16. A method for manufacturing a multi-layer wiring board, comprising the steps of:

forming a wiring circuit on at least one of a surface and a rear surface of the motherboard;

making a via hole; and

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laminating a base material having a wiring circuit which is formed into a predetermined outer shape.

17. The method for manufacturing a multi-layer wiring board according to claim 15 or claim 16, wherein an outer shape of the base material having a wiring circuit is smaller than the outer shape of the motherboard.

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18. The method for manufacturing a multi-layer wiring board of any one of claims 15 to 17 further comprising the step of:

forming a cover layer having an opening for positioning the base material having a wiring circuit prior to the operation of laminating the base material having a wiring circuit with the motherboard .

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19. The method for manufacturing a multi-layer wiring board according to any one of claims 15 to 18 further comprising the step of:

forming a cover layer for coating the motherboard and the base material

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having a wiring circuit after the operation of laminating the base material having a wiring circuit with the motherboard.

20. A multi-layer wiring board comprising:

- 5 a motherboard; and
- at least two base materials with single-sided wiring circuit, which are laminated with the motherboard,
- wherein the motherboard wiring board and the base material with single-sided wiring circuit are electrically connected to each other through an inner via hole, and
- 10 the at least two laminated base materials are positioned so that the contour of one base material being laminated with the other base material is positioned inside the contour of the other base material being laminated with the motherboard.

21. The multi-layer wiring board according to claim 20, wherein the contour of the

15 base material with single-sided wiring circuit is smaller than the contour of the motherboard circumference of the base material with single-sided wiring circuit is positioned inside circumference of the motherboard and wherein the base material with single-sided wiring circuit being formed into an island shape on the motherboard viewed from the laminating direction of the base materials.

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22. The multi-layer wiring board according to claim 20 or claim 21, wherein the motherboard comprises an insulating layer made of a flexible resin.

23. The multi-layer wiring board according to any one of claims 20 to 22, wherein the

25 base material with single-sided wiring circuit comprises an insulating layer made of a flexible resin.

24. The multi-layer wiring board according to any one of claims 20 to 23, wherein the insulating layer of the motherboard and the insulating layer of the base material with

30 single-sided wiring circuit are made of the same material.

25. The multi-layer wiring board according to any one of claims 20 to 24, wherein a cover layer for coating the motherboard is formed.

5 26. The multi-layer wiring board according to any one of claims 20 to 25, wherein the inner via hole of the base material with single-sided wiring circuit is filled with conductive paste to electrically connect different layers one another.

27. A method for manufacturing a multi-layer wiring board, comprising the step of:
10 laminating a base material with single-sided wiring circuit which is formed into a predetermined outer shape to at least one of the surface and rear surface of the motherboard.

28. A method for manufacturing a multi-layer wiring board comprising the steps of:
15 preparing a resin plate to be used for a base material with single-sided wiring circuit;
forming a circuit portion on one surface of the resin plate;
making a via hole that penetrates the resin plate from the one surface to the other surface to reach at least one portion of the circuit portion formed on the one
20 surface of resin plate;
injecting conductive paste into the via hole;
provisionally curing the conductive paste;
dividing the base material with single-sided wiring circuit being formed by previous steps into a plurality of base materials with single-sided wiring circuits;
25 positioning the base materials with single-sided wiring circuits on the motherboard to be placed thereon; and
laminating the base materials with single-sided wiring circuits and the motherboard through a colaminating process while heating the base materials and the motherboard so that a main curing process on the conductive paste is performed.

29. A multi-layer wiring board comprising:

a main single-sided circuit board which is comprised of a insulating base material including a conductive pattern on one face of the insulating base material,

5 wherein at least one portion of the insulating base material is partially removed so that the rear face of the conductive pattern is exposed at the removed portion,

and wherein at least one of an electric part and a single-sided circuit board for multi-layer wiring board having an interlayer conductive portion and a conductive pattern formed on one face of an insulating layer is electrically connected with a portion of the conductive pattern being exposed from the rear side of the insulating base material.

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30. The multi-layer wiring board according to claim 29, wherein an electronic part is electrically connected with the conductive pattern of the main single-sided circuit from the one side of the main single-sided circuit board and a single-sided circuit board for multi-layer wiring board which is comprised of an interlayer conductive portion and an insulating base material including a conductive pattern formed on one face of the insulating base material is laminated so that the conductive pattern of the single-sided circuit board for multi-layer wiring board is electrically connect with the conductive pattern of the main single-sided circuit board.

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31. The circuit substrate according to claim 29 or 30, wherein the main single-sided circuit board comprises a flexible wiring board.

25 32. The multi-layer wiring board according to any one of claims 29 to 31, wherein the main single-sided circuit board further comprises a motherboard, and the contour of the single-sided circuit board for multi-layer wiring board is smaller than the contour of the motherboard, and wherein the single-sided circuit board for multi-layer wiring board is arranged to form an island shape on the motherboard.

33. A method for manufacturing a multi-layer wiring board, comprising the steps of:

forming a conductive pattern on a conductor layer being formed on one surface of an insulating base material of a laminated board including conductor layer formed on one surface which is processed as a starting material of a main single-sided circuit board;

removing a portion of the insulating base material of the main single-sided circuit board so that a rear surface of the conductive pattern is exposed from the removed portion of the insulating base material;

electrically connecting the conductive pattern being exposed in the removed portion with at least one of a electrical part from the rear side of the insulating base material of the main single-sided circuit board and a conductive pattern formed on an insulating layer of a single-sided circuit board for multi-layer wiring board having an interlayer connecting portion; and

electrically connecting at least one of the conductive pattern on the one side of the main single-sided circuit board with a electrical part from the one side of the insulating base material of the main single-sided circuit board and the conductive pattern being exposed in the removed portion with a conductive pattern formed on an insulating layer of a single-sided circuit board for multi-layer board having an interlayer connecting portion.

34. The method for manufacturing a multi-layer wiring board according to claim 33, wherein removing process of the insulating base material of the main single-sided circuit board comprises an etching process or a laser process.

35. The method for manufacturing a multi-layer wiring board according to claim 33 or claim 34, wherein electrically connecting processes is carried out through a colaminating process.

36. A multi-layer wiring board comprising:

a relay board which is comprised of an adhesive insulating base material and a

base material with single-sided wiring circuit having a conductor layer on one surface of the insulating base material;

and a wiring board for partial multi-layer being laminated on a desired area of the relay board, wherein

5 the relay board further comprises an insulating resin layer formed on the conductor layer surface side, an interlayer conductive portion being comprised of a via hole which is filled with injected conductive substance and formed in the adhesive insulating base material and an interlayer conductive portion being comprised of a via hole which is filled with injected conductive substance and formed in the insulating
10 resin layer,

and wherein the wiring board for partial multi-layers are laminated on respective desired areas on the opposite surface of the conductive layer of the adhesive insulating base material and the surface of the insulating resin layer so that the wiring board for partial multi-layers are electrically connected with the relay board
15 accordingly.

37. A multi-layer wiring board comprising:

a relay board which is comprised of an insulating base material having a conductor layer, an insulating resin layer coating the conductor layer and an interlayer
20 bonding layer; and

a wiring board for partial multi-layer being laminated on a specific area of the relay board, wherein

the relay board further comprises an interlayer conductive portion being comprised of a via hole which is filled with injected conductive substance and formed
25 in the interlayer bonding layer and the insulating base material and wherein the wiring boards for partial multi-layer are laminated on respective desired areas on the surface of the interlayer bonding layer and the surface of the insulating resin layer so that the wiring board for partial multi-layers are electrically connected with the relay board accordingly.

38. The multi-layer wiring board according to claim 36 or claim 37, wherein the insulating resin layer of the relay board also performs as an interlayer bonding layer.

39. The multi-layer wiring board according to any one of claims 36 to 38, wherein the wiring board for partial multi-layer further comprises a base material with single-sided wiring circuit that includes an adhesive insulating base material and a conductor layer being formed on the adhesive insulating base material,

and wherein the wiring board for partial multi-layer is laminated with the relay board and land portions formed on the surfaces of the adhesive insulating base material of the both outer surface side of the wiring board for partial multi-layers portion being laminated on both sides of the relay board are electrically connected with a electrical art.

40. The multi-layer wiring board according to an one of claims 36 to 38, wherein the wiring board for partial multi-layer further comprises a base material with single-sided wiring circuit that includes an insulating base material an interlayer bonding layer coating the insulating base material and a conductor layer being formed on the interlayer bonding layer,

and wherein the wiring board for partial multi-layer is laminated with the relay board, and land portions formed on the surfaces of the interlayer bonding layers of the both outer surface side of the wiring board for partial multi-layers portion being laminated on both sides of the relay board are electrically connected with a electrical part.

41. The multi-layer wiring board according to any one of claims 36 to 38, wherein the wiring board for partial multi-layer is comprised of a base material with single-sided wiring circuit that has a conductor layer on an adhesive insulating base material,

wherein the wiring board for partial multi-layer is laminated with the relay board under condition that the conductor layer surface of the wiring board for partial multi-layer being faced to the relay board,

and wherein contact holes for electrically connecting with an electrical part are formed in an adhesive insulating base material so that the contact portions are communicated with land portions being formed on conductor layers of the wiring board for partial multi-layers of both sides of the outermost partial multi-layer portions of the relay board.

42. The multi-layer wiring board according to any one of claims 36 to 38, wherein

the wiring board for partial multi-layer is comprised of a base material with single-sided wiring circuit that includes an insulating base material an interlayer bonding layer coating the insulating base material and a conductor layer formed on the insulating base material,

wherein the wiring board for partial multi-layer is laminated with the relay board under condition that the conductor layer surface of the wiring board for partial multi-layer being faced to the relay board,

and wherein contact holes for electrically connecting with an electrical art are formed in an insulating base material and an interlayer bonding layer so that the contact portions are communicated with land portions being formed on conductor layers of the wiring board for partial multi-layers of both sides of the outermost partial multi-layer portions of the relay board.

43. A method for manufacturing a multi-layer wiring board comprising the steps of:

forming a circuit on a conductor layer formed on only one surface of an adhesive insulating base material of a wiring circuit board base material being processed as a starting material for a relay board;

forming an insulating resin layer coating the conductor layer of the adhesive insulating base material;

making via holes in the adhesive insulating base material and the insulating resin layer of the relay board so that interlayer conductive portions being filled with a conductive substance injected into the via holes are formed in the insulating resin layer and the adhesive insulating base material; and

laminating a wiring board for partial multi-layer being preliminarily formed into a predetermined outer shape at least on one of a specific area on the surface of the adhesive insulating base material and a specific area on the surface of the insulating resin layer so that the wiring board for partial multi-layer is electrically connected with the relay board.

44. A method for manufacturing a multi-layer wiring board comprising the steps of:

forming a circuit on a conductor layer formed on one surface of an insulating base material of a wiring circuit board base material being processed as a starting material for a relay board;

forming an interlayer bonding layer on the other surface of the insulating base material of the wiring circuit board base material;

forming an insulating resin layer coating the conductor layer of the insulating base material;

making via holes in the insulating base material the insulating resin layer, and the interlayer bonding layer so that interlayer conductive portions being filled with a conductive substance injected into the via holes are formed in the insulating resin layer, the insulating base material and the interlayer bonding layer; and

laminating a wiring board for partial multi-layer being preliminarily formed into a predetermined outer shape at least on one of a specific area on the surface of the insulating resin layer and a specific area on the surface of the interlayer bonding layer so that the wiring board for partial multi-layer is electrically connected with the relay board.

45. A forming-use member in which a plurality of the base materials with wiring circuits to be used for the multi-layer wiring board disclosed in claim 1 are formed.